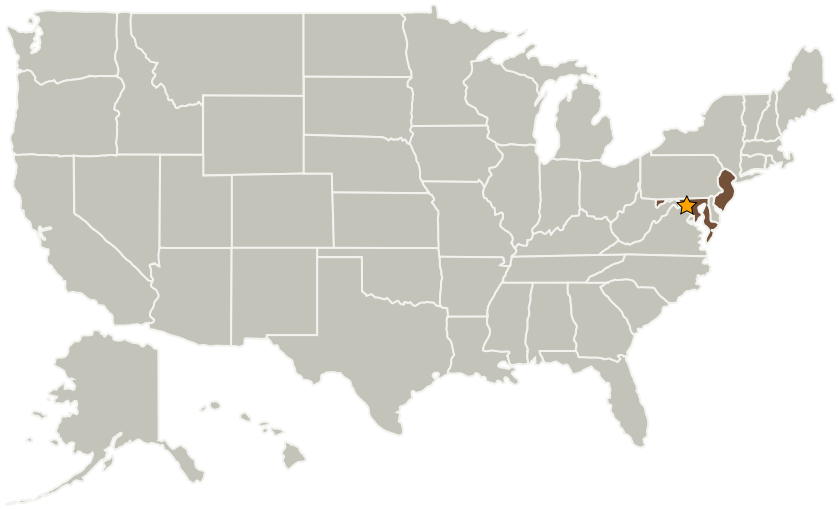
Ultra-Low Noise Quad Photoreceiver for Space Based Laser Interferometric Gravity Wave Detection, Phase I

Completed Technology Project (2009 - 2009)

Project Introduction

Gravity wave detection using space-based long-baseline laser interferometric sensors imposes stringent noise requirements on the system components, including the large area photoreceiver front ends. The proposed innovation utilizes dual depletion region technology to produce a large area (1mm diameter) 2x2 quad p-i-n InGaAs photodiode array having ~2.1pF capacitance per quadrant. The small capacitance of the quad photodiode array is leveraged in combination with a low-noise JFET-input operational amplifier to manufacture ultra-low noise quad photoreceiver array. Each element (quadrant) of the photoreceiver array will have an input equivalent current noise <2pA/sq.rt. Hz in a frequency range of 2 to 20MHz. This will enable shot noise dominated performance at an optical local oscillator power of ~100mW per quadrant.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Discovery Semiconductors, Inc.	Supporting Organization	Industry Minority-Owned Business	Ewing, New Jersey

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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Maryland	New Jersey

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes